

## CLAIMS

### WHAT IS CLAIMED IS:

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1. A method for automatically managing the communication channel resources between two transceiver nodes having neighboring transceiver nodes in a network of transceiver nodes, wherein each node communicates during specific time slots and uses multiple frequencies on a time multiplex basis, the method comprising:
- storing possible communication time slots and frequencies between nodes in the network at each transceiver node;
  - applying clique activation wherein multiple transceiver nodes in a clique utilize the same time slot for transmitting.
2. The method of claim 1 wherein the transceiver nodes within a clique take turns transmitting within a shared time slot.
3. The method of claim 1 further comprising:  
calculating the cliques for the network of transceiver nodes.
4. The method of claim 3 wherein the calculating step comprises:  
performing a depth-first walk tree algorithm.
5. The method of claim 4 wherein the depth-first walk tree algorithm is optimized by the steps of:
- creating a new branch only when adding a neighbor of all of the current clique members;
  - adding neighbors in increasing order of transceiver node id; and
  - trimming branches that have been generated by a different permutation of the same neighbors.
- continued

6. A method for automatically managing the communication channel resources between two nodes having neighboring nodes in a network of transceiver nodes, wherein each node communicates during specific time slots and uses multiple frequencies on a time multiplex basis, the method comprising:

storing a table of possible communication time slots and frequencies between nodes in the network at each node;

measuring the qualities of each neighboring node;

distributing the neighboring node qualities to neighboring nodes;

calculating cliques; and

choosing time slots for each clique.

7. The method of claim 6 further comprising:

applying link activation to announce and transmit, a specific transmit slot and frequency from a first node to a second node.

8. The method of claim 6 further comprising:

transmitting from the first node a control packet containing:

a set of neighbors with their measured qualities;

a set of the first node's cliques with the associated chosen time slots; and

a set of the first node's neighbor's cliques with the associated chosen time slots.

9. The method of claim 6 wherein the choosing time slots step comprises:

- (a) assigning a time slot to a node that is only a member of one clique;
- (b) assigning a time slot to nodes in a clique that at least as many neighboring cliques as any neighboring clique;
- (c) assigning a time slot to nodes at least two neighbors having had time slots assigned in steps (a) and (b);
- (d) assigning a time slot to nodes having at least two neighbors having had time slots assigned in step (a);
- (e) assigning a time slot to a node that has not been covered by a clique in steps (a) through (d); and
- (f) assigning a time slot to a node that was not assigned a slot in steps (a) through (e).

10. A communication network comprising:

a network of transceiver nodes, each transceiver node having neighbors, utilizing a time division multiple access structure, the time division multiple access structure having management slots, broadcast slots, and reservation slots, and the time division multiple access structure including,

a clique activation slot assignment protocol that chooses the number of slots to assign to each neighboring transceiver node and coordinates the activation of the slots for the neighboring transceiver nodes.

11. The communication network of claim 10 further comprising:  
a management slot protocol.

12. The communication network of claim 10 further comprising:  
at least one adaptive slot handling heuristic that controls the assignment of slots.

13. The communication network of claim 12 wherein the management slot protocol is a dynamic management slot protocol.

14. The communication network of claim 12 wherein the bootstrap slot protocol is a fixed management slot protocol.

15. The communication network of claim 12 wherein the at least one adaptive slot handling heuristic includes a soft circuit protocol for allocating time slots in response to traffic demands during transmission of information.

16. The communication network of claim 12 wherein the at least one adaptive slot handling heuristic includes a hard circuit protocol for allocating time slots prior to transmitting information.

17. The communication network of claim 12 wherein the at least one adaptive slot handling heuristic includes a standby slot protocol that assigns broadcast slots to unreserved reservation slots.

18. The communication network of claim 18 wherein the at least one adaptive slot handling heuristic includes a speculation slot protocol that allows other nodes to use broadcast slots that are unused by the node assigned to the broadcast slot.

19. The communication network of claim 10 wherein the cliques are calculated by a depth-first walk tree algorithm.

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